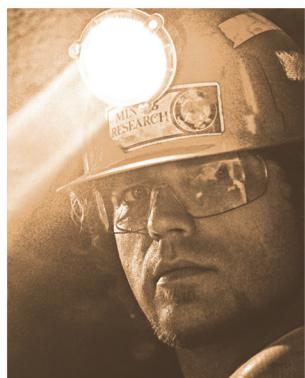


NIOSH BIBLIOGRAPHY OF COMMUNICATION AND RESEARCH PRODUCTS | 2019

A Long Journey to Worker Protection



The Occupational Safety and Health Act of 1970
... 50 Years and Counting

Cover: The photographs on the cover of the *NIOSH Bibliography of Communication and Research Products 2019* represent workers from the history of the United States whose dedication to their jobs and struggles with workplace safety and health have inspired federal, state, and local government action to protect workers in all vocations. The photographs, most taken by acclaimed photographer Gordon Parks, represent all sectors within the National Occupational Research Agenda. These sectors include the following:

- Agriculture, Forestry and Fishing
- Construction
- Healthcare and Social Assistance
- Manufacturing
- Mining
- Oil and Gas Extraction
- Public Safety
- Services
- Transportation, Warehousing and Utilities
- Wholesale and Retail Trade

All cover photographs are from the U.S. Library of Congress.

NIOSH

Bibliography of Communication and Research Products

2019

DEPARTMENT OF HEALTH AND HUMAN SERVICES
Centers for Disease Control and Prevention
National Institute for Occupational Safety and Health

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April 2020

Foreword

Congress passed the Occupational Safety and Health (OSH) Act in 1970 so workers would no longer carry the heavy burden of workplace risk. Before its passage, tens of thousands of American lives were lost at work each year. Survivors of workplace injuries paid a heavy toll in lost wages, pain, and suffering.

The OSH Act created the National Institute for Occupational Safety and Health (NIOSH), giving it authority to conduct occupational safety and health research. We were gifted a mission to pursue safe and healthful work conditions for all workers across the United States through scientific endeavors, leading to recommendations, guidance, and many other publications. The act was passed to ensure that all workers have a safe and healthy workplace. It was a promise made to both current and future generations of workers.

Fifty years since passage of the OSH Act, we continue to strive for excellence. This bibliography represents the scientific endeavors and communication products NIOSH has achieved during 2019 in pursuit of excellence. Each year, a new edition of this bibliography marks a year of progress.

Some old challenges remain and new challenges are emerging. This anniversary gives us an opportunity to reflect on our past and look to the challenges the future of work presents.

Please explore this bibliography and share it freely in workplaces and with our colleagues in the occupational health and safety community.



John Howard, M.D.
Director,
National Institute for
Occupational Safety and Health

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OSH Act at 50: A Special Report

50 Years Ago ... A New Era for Worker Health and Safety

The Occupational Safety and Health (OSH) Act of 1970 promotes safe and healthful work conditions for all working men and women, regardless of their industry or job. The OSH Act created the National Institute for Occupational Safety and Health (NIOSH), a part of the Centers for Disease Control and Prevention in the Department of Health and Human Services. The act created the Occupational Safety and Health Administration (OSHA) and placed it in the Department of Labor. NIOSH is an independent research program, separate from the regulatory OSHA, which sets and enforces occupational safety and health standards, promotes safety and health training and education, and works with stakeholders to develop innovative and creative approaches to preventing workplace hazards.

The OSH Act separated the two agencies to give NIOSH independence to generate objective scientific research findings in the field of occupational safety and health.

The OSH Act also provided NIOSH with right-of-entry authority to make inspections and question employers and employees. NIOSH was charged with conducting education programs, providing safety and health specialists, and developing information on the proper use of safety and health equipment. The OSH Act intends for NIOSH-produced research to inform OSHA safety and health standards.

To better understand the OSH Act, the following sections explore the reasons why it came to be.

The Occupational Safety and Health Act of 1970

established **NIOSH** to research health and safety, and **OSHA** to enact regulations.

5

Section 5 requires employers to provide a safe and healthful workplace.

Section 8 requires employers to notify OSHA in 8 hours if a worker dies or if three or more are hospitalized from a work-related incident.

Preventable Worker Deaths and Illnesses Through the Years

Roots of Tragedy

The roots of U.S. occupational safety and health regulation date back to the late 19th century. It was all too common then for state labor bureaus to report on uncommon and horrific industrial tragedies [MacLaury 1981]. The large loss of life due to events that were wholly preventable spurred a labor movement for social reform. In 1877, Massachusetts passed the first factory inspection law, requiring factory owners to place guards between workers and machinery and to provide protection on elevators and fire exits [Massachusetts Bureau of Statistics of Labor 1870–1916]. Other states followed suit, but not enough to stop hundreds of thousands of lives from being lost at work over the century that followed.

The story of labor during the late 19th century up until the passage of the OSH Act of 1970 is a troubling one, riddled with industrial accidents and tragedies.

1873: Gloucester Fishing Fleet

In the late 1800s, an abundance of Atlantic cod led to the rapid expansion of the fishing fleet in Gloucester, Massachusetts. The fleet numbered about



Photo by Library of Congress

A schooner is docked at a Gloucester port in 1900. The top-heavy vessels brought danger to the fishing profession.

400 vessels, with a mostly immigrant, largely Portuguese crew. Like others in the fishing industry, Gloucester fishermen had a high mortality rate. Workers who fished from schooners, top-heavy vessels more likely to capsize in rough seas, often failed to return home from expeditions. From 1866 through 1890, the fishing fleet in Gloucester lost 2,450 men. A particularly devastating loss happened August 24, 1873, when one storm took the lives of 128 men, along with nine fishing vessels.

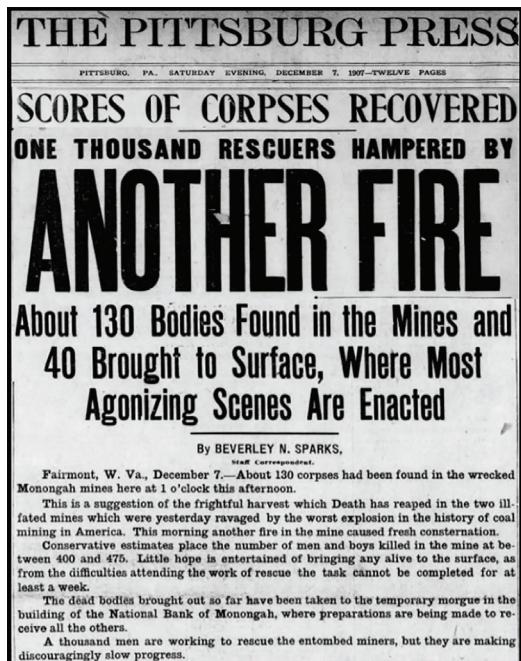


Photo by The Pittsburg Press

The Pittsburg Press announces in giant letters that another fire has claimed lives at the Monongah mine. The blast killed 362 miners in 1907, a year when four mine explosions killed 692 mine workers.

1907: Monongah Mining Disaster

December 6 is St. Nicholas Day, a significant religious holiday, especially for some immigrants. The worst mining accident in American history also happened that day. The disaster occurred in two mines, Nos. 6 and 8, of the Fairmont Coal mine in Monongah, West Virginia. At about 10:20 a.m., a massive underground explosion destroyed the entrance to the mine. Metal, timber, and rock flew into the air. After the blast, four miners walked out and another was found alive hours later. Eventually, 362 bodies of boys and men were recovered. Most were killed instantly, while others suffocated or were poisoned by the gases in the mine. The dead were largely immigrants. The exact cause of the explosion is unknown; however, a coroner's jury at the time concluded that a dynamite blast or the ignition of blasting powder set off the explosion that ended so many lives.

1911: Triangle Shirtwaist Factory Fire

In 1911, the Triangle Fire started in a scrap bin in a clothing factory occupying the eighth-through-tenth floors of the Asch building in lower Manhattan. Hundreds of mostly young, immigrant women were working at the time. A manager discovered the fire and tried to put it out, but the hose had rusted closed. Without a sprinkler system, the fire quickly spread. Management kept the exit doors locked, preventing access to stairways. As workers fled down the single fire escape, it collapsed. Firefighters tried to reach the factory floors, but their ladders were too short. The official death count from the Triangle fire is 146. Though many died by fire and smoke inhalation, some were crushed from the pressure of the crowd as they tried to open the locked exit doors. Others were crushed when they jumped down elevator shafts or out windows to escape the flames.



Photo by Library of Congress

Families of the victims of the 1911 Triangle Shirtwaist Factory fire gather outside a morgue.

1929: Cleveland Clinic Fire

During a particularly busy morning on May 15, 1929, when patients filled the Cleveland Clinic Foundation building, one massive explosion was followed by another. Three-to-four tons of nitrocellulose X-ray film stored in the basement had ignited and exploded. The heat source causing the ignition was likely a light bulb or steam pipe. The explosions forced deadly fumes through a pipe tunnel and ducts system,



Photo by Cleveland Clinic to Wikimedia Commons

Highly flammable X-ray film sparked a 1929 fire at Cleveland Clinic that caused 123 deaths.

reaching every room in the building. Caught unaware by the poisonous vapor, most inside the clinic collapsed either where they were or while trying to escape. Fumes and flames filled the stairwells. There was no sprinkler system. Of the 234 patients and employees in the clinic at the time, 123 died from inhaling the noxious fumes. Most died immediately, while some died days later. A first responder, Officer Ernest Staab, died days after pulling 21 people from the building.

1930s: Hoover Dam Construction

In 1928, then President Coolidge authorized the Boulder Canyon Project to build what would later be known as the Hoover Dam. Although eventually named as a National Historic Landmark and an engineering “wonder,” the new dam came with a high human cost. The official death count during construction is reported at 96 “industrial” fatalities: deaths caused by falls, rock slides, heat, blasting, electrocution, strikes by heavy equipment, drowning, and others. Unofficial numbers include dozens more fatalities, as workers also died while surveying the land, laying miles of electrical lines, and constructing rail lines to bring materials. Other worker deaths were considered “nonindustrial fatalities.” Most of these were logged by the company as caused by pneumonia, but

families disputed that claim. They believed the deaths came from carbon monoxide exposure, and they claimed the employer logged pneumonia as the cause of death to avoid a death benefit payment.

1947: Texas City Industrial Disaster

On April 16, 1947, a freighter, the S.S. Grandcamp, was docked at the Port of Texas City. The crew loaded its cargo, which included about 2,200 tons of the fertilizer ammonia nitrate. At about 8 a.m., the crew discovered a small fire in the hold. At the captain’s direction, workers tried to suppress the flames without water because water would ruin the cargo. The fire grew, and the colorful smoke attracted onlookers. At 9 a.m., the Texas City volunteer fire department arrived. At 9:12 a.m., the ship exploded. The force of the violent blast leveled about 1,000 buildings, including oil storage facilities, railway warehouses, and hundreds of homes. Most workers and bystanders were killed instantly. This included the chief and all but one of the firefighters. A nearby Monsanto chemical plant was destroyed, with 234 of 574 workers killed that day. The explosion also started fires in nearby ships. About 15 hours after the S.S. Grandcamp explosion, another freighter loaded with ammonia nitrate exploded, and two more died. In total, almost 600 people died and



Photo by Library of Congress

A damaged ship lists amid the blast devastation at the 1947 Texas City naval yard scene.

thousands more were injured in one of the largest industrial disasters in history.

1964: C.P. Baker Drilling Barge Accident

In the early morning hours of June 30, 1964, a 2-year-old C.P. Baker drilling barge capsized in the Gulf of Mexico. Constructed like a catamaran with two 260-foot hulls, the vessel was drilling the 22nd well of its career. Around 3 a.m., water surrounding the vessel began to

bubble, shooting up between the two hulls with such force that it entered the main deck. In 5 minutes, an explosion on the barge engulfed the entire vessel. A blowout, the uncontrolled release of crude oil from a well after pressure control systems fail, triggered the disaster. Thirty minutes later, the boat capsized. Of the 43 crew on board, 21 died and 22 were injured.

More about the long history of worker deaths, injuries, and illnesses appears in the timeline on pages xii and xiii.

How the OSH Act Passed in a Bipartisan Congress

In 1965, the Public Health Service called for a major national occupational health program to protect the safety and health of the U.S. workforce. Under President Lyndon Johnson's direction, the Departments of Labor and Health, Education, and Welfare were tasked with developing a legislative proposal. In 1966, the taskforce became gridlocked over which department would lead the new program.

A year later, a health tragedy among uranium miners broke the gridlock. More than 100 miners had died of lung cancer and thousands more were ill. The danger of radiation exposure among miners was known in 1947; however, no federal agency had clear jurisdiction [MacLaury 1981].

In 1968, President Johnson called on Congress to enact the Department of Labor's version of the job safety and health program. Johnson argued that each year more than 14,000 workers were killed and 2.2 million workers were injured on the job due to a lack of standards, poor enforcement of regulations, shortages of safety and health personnel, and a patchwork of ineffective federal laws [Johnson 1968].

Congressional committee hearings on the Johnson proposal began in February 1968. Organized labor supported the bill. Industry opposed it. Industry campaigned

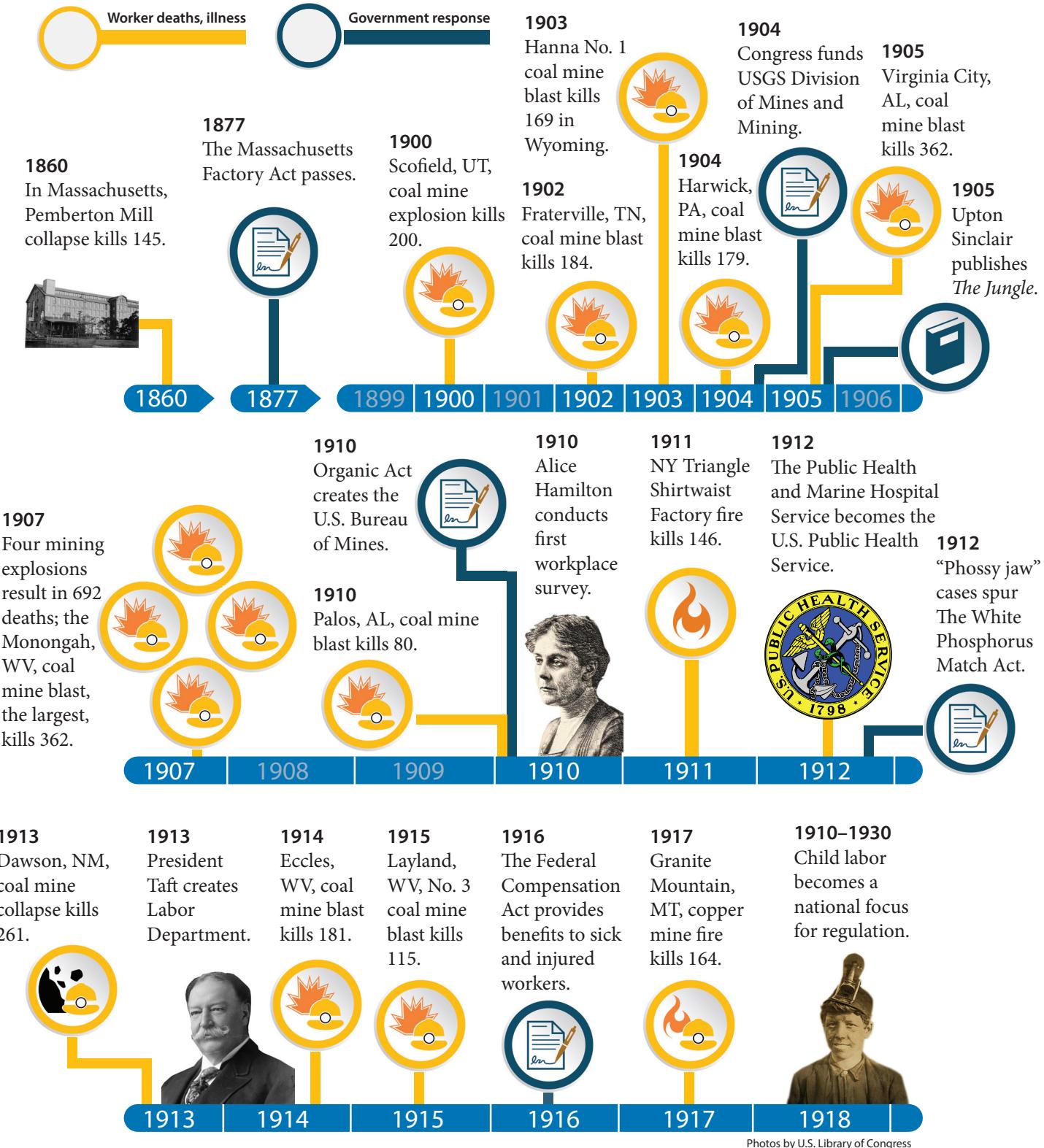
that the bill would undermine states' rights. Congress never voted on it. Violence in inner cities and the Vietnam War diverted the United States. The Johnson proposal failed.

In 1969, President Richard Nixon gave Congress his vision of a job safety and health program. Nixon's plan would establish a five-person board to set and enforce job safety and health standards. The Labor Department would be limited to inspecting workplaces, and the Health, Education, and Welfare Department would conduct research. Industry and the U.S. Chamber of Commerce strongly supported Nixon's plan. The new proposal was not widely popular in Congress, particularly among Democrats. One of the most compelling arguments against Nixon's proposal came from witness descriptions of construction workers suffering from asbestos [MacLaury 1981].

In 1969, Democrats presented a bill similar to Johnson's proposal. Despite Republican efforts, the bill made it to committee. Although opponents delayed consideration until after the election, the bill made it through. In 1970, President Nixon signed the Occupational Safety and Health Act of 1970, ending a 3-year legislative battle.

A Time to Act

Worker Deaths, Illnesses Prompt Occupational Safety and Health Act of 1970



Photos by U.S. Library of Congress



1920
United States issues first approval of a respiratory protective device.

1924
Benwood, WV, coal mine blast kills 119.



1927–1935
Construction of WV Hawks Nest Tunnel causes occupational silicosis, leading to 109 deaths.


1924
Castle Gate, UT, mine blast kills 172.


1928
Mather, PA, No. 1 coal mine blast kills 195.


1931
After the lung disease asbestosis is identified, the first asbestos industry regulations are published.


1933
The Wagner-Peyser Act establishes the U.S. Employment Service.


1935
National Labor Relations Act passes.




1931–1936
Boulder Dam (later Hoover Dam) project kills at least 96 workers.


1937
Apprenticeship Act passes.


1938
Fair Labor Standards Act codifies 40-hour work week.


1941
Federal Coal Mine Inspection Act passes.



1944
Natural gas tank blast kills 130 in East Ohio.


1944
Naval Magazine explosion at Port Chicago, CA, kills 320.


1947
Centralia, IL, coal mine blast kills 111 miners.


1947
S.S. Grandcamp explodes in port, killing 581.


1951
Coal mine blast in West Frankfort, IL, kills 119.


1951
Sen. Hubert Humphrey proposes federal job safety law.


1952
Federal Coal Mine Safety Act passes.


1969
Federal Coal Mine Health and Safety Act of 1969 passes.


1970
Congress passes Occupational Safety and Health Act of 1970 and the Clean Air Act.


1967
Study reveals high rate of cancer in uranium miners.


1950s

1960s

Photos by U.S. Library of Congress

Why we need the OSH Act today

The OSH Act of 1970 was the first comprehensive federal law regulating the safety and health of the U.S. workforce. OSHA estimates that in 1970 around 14,000 workers lost their lives at work [OSHA 2010]. Today the working population is around 155 million workers, almost double the number in 1970 [BLS 2019a]. We have made progress. In 2018, around 5,000 workers lost their lives at work [BLS 2019b].

In 2018, more than 3.5 million workers were injured or harmed on the job [BLS 2019c]. NIOSH holds as a basic tenet that all workplace injuries and illnesses are preventable. In 2020 the OSH Act is as necessary today as it was 50 years ago.

What the OSH Act has accomplished

During the OSH Act's first decade, NIOSH contributed much to occupational safety and health. In 1971, NIOSH published the *Criteria for a Recommended Standard on Asbestos* and the *Toxic Substances List*. In 1974, the NIOSH/OSHA Standards Completion Program became the basis for 387 new OSHA standards. In 1975, NIOSH published the first of its Current Intelligence Bulletins (CIBs). These were followed by the *NIOSH Pocket Guide to Chemicals* in 1978.

NIOSH continued its momentum in its second decade. In 1986, NIOSH released *Proposed National Strategies for the Prevention of Leading Work-Related Diseases and Injuries*, a strategic plan for the top 10 work-related diseases and injuries. That same year, NIOSH partnered with the United Nations International Labour Organization (ILO) Programme on Chemical Safety to launch International Chemical Safety Cards.

In the following decade, in 1991, NIOSH issued a ground-breaking *Current Intelligence Bulletin: Promoting Health and Preventing Disease and Injury Through Workplace Tobacco Policies on Secondhand Tobacco Smoke in the Workplace*. Five years later, responding to a surge in violence against workers, NIOSH issued findings and recommendations for preventing workplace homicides and assaults. In 1996, NIOSH unveiled the National Occupational Research Agenda (NORA), a public-private partnership between industry, labor, and government to stimulate innovative research and improve workplace practices. NORA is now in its third decade and consists of 10 industry sectors based on major areas of the U.S. economy. Each of these sectors has accomplished remarkable achievements toward improving the safety and health of the U.S. workforce.



Agriculture, Forestry and Fishing

- In 1987, NIOSH established the Sentinel Event Notification System for Occupational Risks–Pesticides Program to reduce the number of injuries and illnesses associated with occupational pesticide exposure.
- In 1990, NIOSH partnered with industry to address the high number of fishing fatalities in Alaska. By focusing on fishery-specific hazards, such as vessel overloading in the crab fleet, the partnership reduced fatalities.
- In 2007, NIOSH created the Commercial Fishing Incident Database by collecting risk factor information for fatalities to identify regional hazards for the commercial fishing industry.



Construction

- In 1997, NIOSH gave a new model for conducting research through partnership by publishing *Engineering Control Guidelines for Hot Mix Asphalt Pavers*.

- In 2012, NIOSH, OSHA, and the Center for Construction Research and Training (CPWR, a NIOSH-funded center), along with the NORA Construction Sector Council, launched a National Campaign to Prevent Falls in Construction, a nationwide initiative to prevent falls at construction sites.
- In 2019, CPWR and researchers at Washington State University partnered to develop the Safety Climate Assessment Tool (S-CAT), a free online tool that assesses organizational and job site safety climate.



Healthcare and Social Assistance

- In 1997, NIOSH published an Alert, *Preventing Allergic Reactions to Natural Rubber Latex in the Workplace*.
- In 2004, NIOSH published an Alert, *Preventing Occupational Exposures to Antineoplastic and Other Hazardous Drugs in Healthcare Settings*, and a list of hazardous drugs. The list was made with active input from partners in the healthcare industry, the pharmaceutical industry, and federal agencies. The current government-supported list (*NIOSH List of Antineoplastic and Other Hazardous Drugs in Healthcare Settings, 2016*) of hazardous drugs in the United States is heavily referenced throughout the healthcare industry.
- In 2013, NIOSH published an online course, *Workplace Violence Prevention for Nurses*, to prevent physical and non-physical violence among healthcare workers. The course provides healthcare workers with a valuable tool for preventing, intervening with, and reporting violence in the workplace.



Manufacturing

- In 1997, NIOSH researchers identified a new lung disease, lymphocytic bronchiolitis, in nylon flocking industry workers, reported in *Flock Workers'*

Exposures and Respiratory Symptoms in Five Plants.

- In 2000, NIOSH initiated a program to reconstruct occupational radiation doses for atomic weapons industry workers with cancers who filed claims for compensation under the Energy Employees Occupational Illness Compensation Program Act of 2000.
- In 2002, NIOSH scientists published a study, *Preventing Lung Disease in Workers Who Use or Make Flavorings*, about severe lung disease found in workers at a series of microwave-popcorn plants.
- In 2008, the NIOSH-OSHA-NHCA (National Hearing Conservation Association) Alliance published a joint document, *Best Practice Bulletin: Hearing Protection—Emerging Trends: Individual Fit Testing*. With the development of HPD Well-Fit™, fit-testing has been validated as an effective, practical, and essential tool for preventing occupational hearing loss.



Mining

- In 1997, NIOSH received authority to do mine safety research after the U.S. Bureau of Mines was closed. This brought NIOSH specialists into mine safety engineering and research, creating research sites in Pittsburgh, PA, and Spokane, WA.
- In 2001, NIOSH established the National Personal Protective Technology Laboratory (NPPTL) to prevent and reduce occupational disease, injury, and death for workers who rely on personal protective technologies.
- In 2011, NIOSH scientists developed a light-emitting diode (LED) cap lamp to improve illumination and decrease injury risk for underground miners.



Oil and Gas Extraction

- In 2010, NIOSH partnered with government agencies to give technical

- assistance during the Deepwater Horizon disaster in the Gulf of Mexico.
- Since 2010, NIOSH scientists researched exposure hazards to the oil and gas extraction workforce, including exposures to respirable crystalline silica during manual tank gauging and fluid transfer operations. In 2017, NIOSH researchers published *NIOSH and Partners Work to Prevent Worker Deaths from Exposures to Hydrocarbon Gases and Vapors at Oil and Gas Wellsites*.
 - In 2016, NIOSH and the American Petroleum Institute published a new safety standard, *Custody Transfer of Crude Oil from Lease Tanks Using Alternative Measurement Methods*. This standard describes alternative methods for measuring the quantity and quality of crude oil without opening the tank hatch, protecting workers from exposure to hydrocarbon gases and vapors.



Public Safety

- On September 11, 2001, NIOSH provided technical assistance for rescue and recovery workers to help in their response to terrorist attacks in New York City; at the Pentagon; and near Shanksville, Pennsylvania.
- In 2006, NIOSH commercialized two NIOSH-designed field methods to help first responders, public health officials, and remediation workers quickly detect the presence of methamphetamine on various environmental surfaces.
- In 2011, Congress authorized the World Trade Center (WTC) Health Program, a federal health plan that provides medical care to responders and community survivors of the September 11, 2001, terrorist attacks. To date, more than 100,000 responders and survivors have become WTC Health Program members.
- The NIOSH Fire Fighter Fatality Investigation and Prevention Program as of 2016 has investigated more than 600

firefighter line-of-duty deaths, about 40 percent of firefighter fatalities.



Services

- In the 1980s, NIOSH led pioneering research on emerging safety and health concerns in the Services Sector. These included indoor environmental quality in office buildings and job-related musculoskeletal injuries.
- In 2007, NIOSH published a document, *NIOSH-funded Research Helps Reduce Occupational Exposure to PCBs When Renovating Schools*, focused on the levels of polychlorinated biphenyls (PCBs) in the blood of construction workers who renovated schools built before 1978. This research received widespread media attention, leading to an increase in public knowledge and awareness of the presence of PCBs in older school facilities.
- In 2011, NIOSH-funded researchers developed a hazard alert, *Crossing Guards—Be Seen, Be Safe*, which included local and national injury data, job and safety training requirements, recommended and required personal protective equipment (PPE), and safe work practice recommendations.



Transportation, Warehousing and Utilities

- In 2006, NIOSH researchers began a 4-year study to measure body dimensions in the current truck driver workforce. The resulting software, RAMSIS, is widely used to update and improve truck cab design.
- In 2013, NIOSH scientists guided the Alaska Interagency Aviation Safety Initiative (AIASI) to identify aviation risk factors, conduct a statewide survey of air taxi and commuter operators and pilots, and evaluate the success of safety interventions and regulatory changes.
- In 2014, as a partner in the Mat Su Mid-Air Collision Avoidance Working Group,

NIOSH investigators analyzed data from Federal Aviation Administration (FAA) and Aviation Safety Reporting System databases. The FAA accepted the group's recommendations.



Wholesale and Retail Trade

- In 1981, NIOSH researchers published *Work Practice Guide to Manual Lifting*.
- In 1994, NIOSH researchers published the *Revised NIOSH Lifting Equation*.
- In 2013, NIOSH researchers published *Preventing Slips, Trips, and Falls in Wholesale and Retail Trade Establishments*, which focused on preventing traumatic injuries in the workplace. The guide has been adopted by retail and wholesale companies with high rates of injuries from falls.
- In 2015, the Wholesale and Retail Trade program worked with employers and trade associations to research manual material handling to prevent musculoskeletal disorders (MSDs), publishing *Ergonomic Solutions for Retailers: Prevention of Material Handling Injuries in Grocery Stores*.

Going forward

In 2019, NIOSH launched a Future of Work initiative. Several centers and working groups throughout NIOSH are working internally and in collaboration with external partners and stakeholders to address the occupational safety and health concerns surrounding the future of work.

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The Year in Review

NIOSH in 2019

Below are examples of outstanding research and communication products that advanced the field of occupational safety and health in 2019.

Occupational Exposure Banding Assesses Hazards

The gold standard for assessing and controlling work-related chemical exposure is the occupational exposure limit, or OEL. Although more than 85,000 chemicals are commercially available, according to the U.S. Environmental Protection Agency, only about 1,000 chemicals have an authoritative OEL. As new chemicals are developed and introduced into commerce, the number of chemicals without OELs increases.

To inform chemical risk management in the workplace, NIOSH developed an approach called occupational exposure banding, described in a new report, *The NIOSH Occupational Exposure Banding Process for Chemical Risk Management*, and an accompanying Occupational Exposure Banding e-Tool (e-Tool). Occupational exposure banding is an innovative, voluntary approach that uses information about a chemical's toxicity and health effects to classify it into an appropriate occupational exposure band (OEB) [NIOSH 2019].



Photo by ©Endopack/Getty Images

Scientists tested the process and e-Tool on chemicals with OELs and found that the results were accurate, reproducible, and protective because indicated recommended levels of airborne exposures were at least as protective as the established OELs.

Risk Perception Key to Workplace Safety and Health

A recent study of 1,334 workers from 20 mine sites found that miners who

avoid risk were less likely to experience near-miss incidents, according to a paper published in the *Journal of Loss Prevention in the Process Industries* [Haas and Yorio 2019]. Previous NIOSH research showed that the likelihood of future injury may increase with the number of near misses. These findings suggest that mine operators should consider how individual worker attitudes about risk perception contribute to safety management and could apply to other high-risk industries like chemical processing.



Photo by NIOSH / Wikimedia Commons

Tool Helps Construction Companies Evaluate Safety

A new resource, the Safety Climate Assessment Tool (S-CAT), can help construction companies evaluate their jobsite safety climate, reports a NIOSH-funded study published in the *Journal of Safety Research* [Probst et al.

2019]. Studies have shown that a strong safety climate is associated with better safety and health outcomes. Despite advances to improve safety and health in construction, it remains one of the most hazardous industries. To address this issue, researchers at CPWR—The Center for Construction Research and Training and Washington State University partnered to develop the S-CAT. With this free online tool, respondents use text-based scales to answer questions across eight safety-climate factors.

The researchers used information from 985 respondents to confirm that these factors could reliably measure and also provide companies with a better understanding of their jobsite safety climate. With the S-CAT results in hand, a company can use CPWR's safety climate workbook to identify specific interventions to target lower-scoring factors. Companies can then use the S-CAT at a future date to evaluate how interventions improve the safety climate.

Silicosis Evaluated Among Medicare Beneficiaries

In this novel study [Casey and Mazurek 2019], published in the *American Journal of Industrial Medicine*, investigators looked at health insurance claims and enrollment information for nearly 50 million Medicare beneficiaries age 65 and older from 1999 to 2014. Medicare beneficiaries that met one of the silicosis case definitions were mostly white, but the highest rates were

Safety Climate Assessment Tool (S-CAT)

Demonstrating Management Commitment

Management demonstrates commitment by engaging in the following activities:

1. Being present and visible on the jobsite.
2. Always using safety behaviors and safety practices on the jobsite.
3. Identifying and reducing job hazards.
4. Having processes for corrective action following a safety incident.
5. Compassionately reacting to employee injuries.
6. Reviewing and analyzing safety policies, procedures and trends.

Factor Indicators

Levels of Safety Climate Maturity

**S-CAT
#1**

Safety Climate Factor

Photo by Journal of Safety Research

found among North American Natives. The investigators found that annually 12.4 to 24.9 out of 100,000 beneficiaries had an indication of silicosis in their medical claims. By state, New Mexico, West Virginia, and Utah had the highest rates of silicosis during the 16 years studied. While new cases of silicosis declined from 2002 to 2014, the number of prevalent cases remained constant from 2005 to 2014. These results are consistent with findings from previous silicosis studies in different populations and show how health insurance claims can inform our understanding of silicosis.



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Slip-resistant Shoes Reduce Compensation Claims

Food services operations where workers received free highly slip-resistant shoes showed a large reduction in workers' compensation claims for slip injuries compared with food service operations where workers did not receive the shoes, according to research [Bell et al. 2019] published in the *Scandinavian Journal of Work, Environment & Health*.

Slips, trips, and falls are the third-leading cause of U.S. non-fatal work-related injuries involving days away from work across all industries. Almost 80% of these injuries are on the same level, and these injuries are estimated to cost nearly \$13 billion in direct workers' compensation-related costs annually. Laboratory tests have shown that



Photo by NIOSH

slip-resistant shoes designed with a special tread helped prevent slipping, but studies in actual workplaces were lacking.

Investigators looked specifically at workers' compensation injury claims caused by slipping on wet or greasy surfaces, the type of incident that the shoes were designed to prevent. School districts filed 67% fewer claims for slip injuries after being provided the slip-resistant shoes, compared with no reduction in claims at the school districts that did not receive the shoes.

Needlestick Risk Greatest When Police Do Searches

A recently published NIOSH study [de Perio et al. 2019] in the *American Journal of Infection Control* found that needlestick injuries and other exposures to body substances in one city police department were infrequent but most likely to occur during pat-down and personal property searches. The police department comprised about 1,000 sworn police officers and 125 civilian workers.

Results showed that 13 needlestick injuries occurred during the 6 years studied. These injuries were most likely when police officers performed pat-down,



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property, and vehicle searches. Nine of 11 people searched or otherwise involved in these events tested positive for the hepatitis C virus upon subsequent evaluation. Also, 37 additional body substance exposures occurred from spitting, human bites, and other forms of exposure to blood. None of the police officers were reported to be infected by viruses transmitted by blood. These findings indicate that while needlestick injuries and other body substance exposures occurred infrequently in the police department, they still presented a risk.

Drug Exposures Highlight Need to Protect Responders

In two recent incidents, law enforcement officers developed health symptoms after exposure to opioids and other drugs at work that prevented them from performing their duties. These incidents highlight the need for policies and procedures, as well as education

and training about exposure prevention, according to a report published in the *American Journal of Industrial Medicine* [Chiu et al. 2019].

After officers in two law enforcement agencies experienced health effects related to potential opioid exposure, the agencies requested assistance through the NIOSH Health Hazard Evaluation Program, which provides free workplace evaluations.

The first incident occurred in 2017 when white powder fell onto an officer during a traffic stop in New Hampshire. In the second incident, in 2018, four officers developed symptoms while responding to a call about a possible drug overdose in Virginia. NIOSH investigators interviewed the officers and others and reviewed medical records, incident reports, laboratory results, and body camera footage if available. They found that both incidents involved several types of drugs: opioids, such as fentanyl; and stimulants, including cocaine and methamphetamine. All five officers reported nonspecific symptoms that required medical attention and temporarily prevented them from working, but the symptoms were not consistent with severe or life-threatening opioid toxicity. Although the routes of exposure were not well characterized, the investigators made recommendations to prevent such incidents.

Graphs Improve Studies of Work Exposures in Pregnancy

A NIOSH study [Johnson et al. 2019] used a graphing technique to show how to account for healthy worker effects in studies of work-related exposures in pregnancy.

Workers often tend to be healthier and live longer than their unemployed peers, who may be unable to work due to illness or other issues. A recent study by NIOSH and a university partner aimed to understand how to account for these “healthy worker effects” in studies among pregnant workers.



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Most information on how to account for healthy worker effects comes from studies of long-term diseases and deaths. Since pregnancy is a comparatively short, defined period, pregnancy-related studies need a different approach.

The study used a graphing technique to depict when during pregnancy healthy worker effects were most likely to occur. In addition to the healthy hire effect, which refers to healthier pregnant women being more likely to work, researchers used graphs to look at several possibilities:

- Situations when socioeconomic differences influence who returns to work after pregnancy.
- Women with live births leaving the workforce.
- Women with a previous complicated pregnancy leaving the workforce before the relevant high-risk period occurs.
- Women leaving the workforce at different times depending on various exposures during pregnancy.

Researchers found that using graphs helped accurately identify when during pregnancy each healthy worker effect is most likely. By restricting research to these specific times, and to women already working during these times, researchers

can account for these healthy worker effects in their studies of work exposures during pregnancy.

Curriculum Improves Adolescents' Knowledge

U.S. adolescents (<18 years old) experience a higher rate of job-related injuries compared with adults. Safety education is considered critical to the prevention of these incidents.

To prepare middle- and high-school students for safe and healthy employment, NIOSH and its partners developed a free curriculum, *Youth@Work—Talking Safety*, built on a theoretical framework of foundational workplace safety and health competencies that are fundamental to all jobs. In a new study [Guerin et al. 2019] published in *Prevention Science*, investigators from the NIOSH Safe-Skilled-Ready Workforce Program examined the impact of the *Talking Safety* curriculum on students' knowledge and perceptions of workplace safety and health. The curriculum was delivered by science teachers with strict adherence to the program as it was designed by NIOSH. After receiving curriculum instruction, more than 1,700 eighth graders in Miami-Dade, Florida, the fourth largest



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U.S. school district, scored statistically significantly higher on the outcomes assessed. Specifically, their average scores increased in workplace safety knowledge (34%); attitude (5%); perceived norms related to workplace safety behaviors (7%); self-efficacy, or confidence in one's ability to take appropriate action (7%); and behavioral intention to engage in workplace safety activities (7%).

These findings build on previous research by the same investigators and support using this curriculum to provide adolescents with critical life skills for safe and healthy work.

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Top 5 NIOSH 2019 Products by Altmetric Score

	Endotoxin and (1→3)-β-D-Glucan Contamination in Electronic Cigarette Products Sold in the United States <i>Environmental Health Perspectives</i> , April 2019
	Tuberculosis Screening, Testing, and Treatment of U.S. Health Care Personnel: Recommendations From the National Tuberculosis Controllers Association and CDC, 2019 <i>MMWR: Morbidity & Mortality Weekly Report</i> , May 2019
	Suicide Among Veterinarians in the United States from 1979 Through 2015 <i>Journal of the American Veterinary Medical Association</i> , January 2019
	The Evidence of Human Exposure to Glyphosate: a Review <i>Environmental Health</i> , January 2019
	Trust in the Work Environment and Cardiovascular Disease Risk: Findings from the Gallup-Sharecare Well-Being Index <i>International Journal of Environmental Research and Public Health</i> , January 2019

The Colors of the Donut

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|---------------------------------|-------------------------------|
| ● Policy documents | ● Google+ |
| ● News | ● LinkedIn |
| ● Blogs | ● Reddit |
| ● Twitter | ● Research highlight platform |
| ● Post-publication peer-reviews | ● Q&A (Stack Overflow) |
| ● Facebook | ● Youtube |
| ● Sina Weibo | ● Pinterest |
| ● Syllabi | ● Patents |
| ● Wikipedia | |

Journals Publishing NIOSH Articles in 2019

Rank	Top Journals Ranked by Number of NIOSH Articles Published	No.	
1	Transactions of the Society for Mining, Metallurgy, and Exploration	21	
2	Mining, Metallurgy & Exploration	20	
3	Journal of Occupational and Environmental Hygiene	19	
4	Morbidity and Mortality Weekly Report	18	
5	American Journal of Industrial Medicine	17	
6	Annals of Work Exposures and Health	10	
7	International Journal of Mining Science and Technology	8	
8	Journal of Occupational and Environmental Medicine	7	
9	Journal of the Acoustical Society of America	6	
	International Journal of Environmental Research and Public Health		
10	Safety and Health at Work	5	
	Safety Science		
	Applied Ergonomics		
11	Inhalation Toxicology	4	
	International Journal of Audiology		
	Nanotoxicology		
	Aerosol Science and Technology		
	Health Security		
	International Journal of Coal Science & Technology		
	International Journal of Hygiene and Environmental Health		
	Journal of Asthma		
12	Journal of the American Veterinary Medical Association	3	
	Journal of Toxicology and Environmental Health, Part A: Current Issues		
	Policing: An International Journal of Police Strategies and Management		
	Public Library of Science One		
	Rock Mechanics and Rock Engineering		
	Toxicology and Applied Pharmacology		
			of Evaluation • American Journal of Health Promotion • American Journal of Infection Control • American Journal of Medical Quality • American Journal of Physiology: Cell Physiology • American Journal of Respiratory and Critical Care Medicine • American Journal of Respiratory Cell and Molecular Biology • Annals of Internal Medicine • Anthrozoos • Anticancer Research • Biomarkers • Biometrics • BMC Musculoskeletal Disorders • BMC Public Health • Chemosphere • Chest • Clinical and Experimental Dermatology • Clinical Infectious Diseases • Cochrane Database of Systematic Reviews • Current Opinion in Allergy and Clinical Immunology • Current Opinion in Immunology • Cutaneous and Ocular Toxicology • Disaster Medicine and Public Health Preparedness • Engineering Failure Analysis • Environmental International • Environmental Monitoring and Assessment • Environmental Science: Nano • Epidemiology • Ergonomics • European Journal of Applied Physiology • European Journal of Pain • Fire Technology • Free Radical Biology and Medicine • Frontiers in Pharmacology • GLIA • Health Communication • Health Physics • Home Health Care Management and Practice • Human Factors • IEEE Transactions on Industry Applications • IIE Transactions on Occupational Ergonomics and Human Factors • Infection Control and Hospital Epidemiology • Injury Prevention • International Journal of Biometeorology • International Journal of Hyperthermia • JAMA Network Open • Journal of Aerosol Science • Journal of Applied Physiology • Journal of Biomechanics • Journal of Burn Care & Research • Journal of Chromatographic Science • Journal of Clinical Sleep Medicine • Journal of Emergency Management • Journal of Environmental Health • Journal of Hazardous Materials • Journal of Leukocyte Biology • Journal of Neurochemistry • Journal of Occupational Health Psychology • Journal of Occupational Medicine and Toxicology • Journal of Police and Criminal Psychology • Journal of Public Health Management and Practice • Journal of School Health • Journal of Sustainable Mining • Journal of Testing and Evaluation • Journal of the Air and Waste Management Association • Journal of the American Medical Association • Journal of the American Medical Directors Association • Journal of the Experimental Analysis of Behavior • Journal of the International Society for Respiratory Protection • Journal of Trace Elements in Medicine and Biology • Journal of Workplace Behavioral Health • Lancet Oncology • Lighting Research & Technology • Measurement • Medical Mycology • Metabolism: Clinical and Experimental • Microscopy Research and Technique • Mining Engineering • Mutation Research • Nano Letters • National Institute for Occupational Safety and Health • Neuroscience • Neurotoxicology • New England Journal of Medicine • Noise Control Engineering Journal • Nursing Outlook • Prevention Science • Progress in Electromagnetics Research C • Respiration • Risk Analysis • RSF: The Russell Sage Foundation Journal of the Social Sciences • Safety • Southwest Journal of Pulmonary and Critical Care • SSM - Population Health • The Hearing Journal • The Journal of Infectious Diseases • The Journals of Gerontology Series A: Biological Sciences and Medical Sciences • The Journals of Gerontology Series B: Psychological Sciences and Social Sciences • The Laryngoscope • The Psychological Record • Toxicologic Pathology • Toxicology Letters • Toxicology Reports • Traffic Injury Prevention • Work

Journals Publishing Two Articles

American Journal of Human Biology • American Journal of Preventive Medicine • Analytical Chemistry • Archives of Environmental & Occupational Health • Archives of Toxicology • Chemical Research in Toxicology • Coal Age • Current Environmental Health Reports • Dermatitis • Emerging Infectious Diseases • Industrial Health • International Journal of Industrial Ergonomics • International Journal of Molecular Sciences • Journal of Agromedicine • Journal of Chemical Health and Safety • Journal of Exposure Science and Environmental Epidemiology • Journal of Immunotoxicology • Journal of Loss Prevention in the Process Industries • Journal of Oncology Pharmacy Practice • Journal of Safety Research • NanolImpact • Occupational and Environmental Medicine • Particle and Fibre Toxicology • Pit & Quarry • Police Chief • Preventing Chronic Disease • Scandinavian Journal of Work, Environment & Health • Scientific Reports • The American Journal of Nursing • Toxicological Sciences • Zoonoses and Public Health

Journals Publishing One Article

Accident Analysis and Prevention • Advanced Powder Technology • Aerobiologia • Aerosol and Air Quality Research • Air Quality, Atmosphere, & Health • Allergy • American Journal of Disaster Medicine • American Journal of Epidemiology • American Journal

of Evaluation • American Journal of Health Promotion • American Journal of Infection Control • American Journal of Medical Quality • American Journal of Physiology: Cell Physiology • American Journal of Respiratory and Critical Care Medicine • American Journal of Respiratory Cell and Molecular Biology • Annals of Internal Medicine • Anthrozoos • Anticancer Research • Biomarkers • Biometrics • BMC Musculoskeletal Disorders • BMC Public Health • Chemosphere • Chest • Clinical and Experimental Dermatology • Clinical Infectious Diseases • Cochrane Database of Systematic Reviews • Current Opinion in Allergy and Clinical Immunology • Current Opinion in Immunology • Cutaneous and Ocular Toxicology • Disaster Medicine and Public Health Preparedness • Engineering Failure Analysis • Environmental International • Environmental Monitoring and Assessment • Environmental Science: Nano • Epidemiology • Ergonomics • European Journal of Applied Physiology • European Journal of Pain • Fire Technology • Free Radical Biology and Medicine • Frontiers in Pharmacology • GLIA • Health Communication • Health Physics • Home Health Care Management and Practice • Human Factors • IEEE Transactions on Industry Applications • IIE Transactions on Occupational Ergonomics and Human Factors • Infection Control and Hospital Epidemiology • Injury Prevention • International Journal of Biometeorology • International Journal of Hyperthermia • JAMA Network Open • Journal of Aerosol Science • Journal of Applied Physiology • Journal of Biomechanics • Journal of Burn Care & Research • Journal of Chromatographic Science • Journal of Clinical Sleep Medicine • Journal of Emergency Management • Journal of Environmental Health • Journal of Hazardous Materials • Journal of Leukocyte Biology • Journal of Neurochemistry • Journal of Occupational Health Psychology • Journal of Occupational Medicine and Toxicology • Journal of Public Health Management and Practice • Journal of School Health • Journal of Sustainable Mining • Journal of Testing and Evaluation • Journal of the Air and Waste Management Association • Journal of the American Medical Association • Journal of the American Medical Directors Association • Journal of the Experimental Analysis of Behavior • Journal of the International Society for Respiratory Protection • Journal of Trace Elements in Medicine and Biology • Journal of Workplace Behavioral Health • Lancet Oncology • Lighting Research & Technology • Measurement • Medical Mycology • Metabolism: Clinical and Experimental • Microscopy Research and Technique • Mining Engineering • Mutation Research • Nano Letters • National Institute for Occupational Safety and Health • Neuroscience • Neurotoxicology • New England Journal of Medicine • Noise Control Engineering Journal • Nursing Outlook • Prevention Science • Progress in Electromagnetics Research C • Respiration • Risk Analysis • RSF: The Russell Sage Foundation Journal of the Social Sciences • Safety • Southwest Journal of Pulmonary and Critical Care • SSM - Population Health • The Hearing Journal • The Journal of Infectious Diseases • The Journals of Gerontology Series A: Biological Sciences and Medical Sciences • The Journals of Gerontology Series B: Psychological Sciences and Social Sciences • The Laryngoscope • The Psychological Record • Toxicologic Pathology • Toxicology Letters • Toxicology Reports • Traffic Injury Prevention • Work

Journal Articles

NOTE: The electronic form of the NIOSH *Bibliography of Communication and Research Products*, available at <https://www.cdc.gov/niosh/awards/>, offers links to NIOSHTIC-2 pages and online access to many NIOSH products featured in this publication.

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